STRATEGY RESEARCH PROJECT

CONSTRUCTION CONTRACTING: STRATEGIC AND OPERATIONAL ENGINEERING HARNESSES THE PRIVATE SECTOR IN SUPPORT OF UNITED STATES NATIONAL SECURITY OBJECTIVES

BY

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ABSTRACT

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The United States Army has deployed on numerous occasions since the fall of the Berlin Wall in 1989. These deployments ranged from armed intervention in Panama to a full scale conventional war in the Middle East to humanitarian assistance operations in Africa to peacekeeping operations in Central Europe. On each occasion, the Army has called upon the private sector engineering and construction community worldwide to provide some level of construction work in support of deployed United States forces. The private sector provides what is essentially the strategic engineering capacity of the United States and part of the operational level engineering available to military forces. The engineer force structure, along with the rest of the Army, has declined in size due to perceived lowered threats worldwide and DOD budget constraints. Although structured to support a two major regional contingency threat, the active duty engineer force structure is only 25% of total engineer forces. Numerous factors will continue to require reliance on private sector engineering and construction capabilities to support military forces in the field and broader national security objectives abroad. This paper reviews historical comparisons of engineers deployed in several theaters of operations, discusses use of construction contracting in operations conducted since 1989 and proposes a set of criteria which can be used to determine the appropriateness of construction contracting in support of United States military operations abroad.

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Introduction

The United States political leadership has called upon its military forces many times since the end of the Cold War to serve the nation's interests in accomplishing missions ranging from humanitarian assistance to peacekeeping operations to large scale combat operations. Currently the United States is the only recognized world superpower. This will remain so for the foreseeable future. The historical commitments of this nation, coupled with the realities of the emerging world order indicate that the United States will continue significant worldwide commitment of our forces to similar operations. In most cases, only military forces have the required resources to accomplish the challenging missions which need to be done. However, the Department of Defense has seen since 1989 a dramatic decrease in force structure from Cold War era levels. General John M. Shalikashvili, Chairman of the Joint Chiefs of Staff recently stated:

> "By 1999, our force will be over one-third smaller than it was in 1991 when the Gulf War ended. And our budget will have shrunk by over 40 percent in real terms from what it was in 1988. In fact, our budgets have now been declining for ten straight years. If you add this all up, an awful lot of swords have been pounded into plowshares and an awful lot of great soldiers, sailors, airmen and Marines have been asked to leave the military -- nearly 700,000.[1]

While the operations tempo of our military forces has increased dramatically in the past six years, our force structure has decreased in similar fashion. The current Chief of Staff, United States Army, General Dennis J. Reimer, stated in 1995:

> "The operational pace for our people is at an all time high. In fiscal year 1995, the Army saw an average of 22,200 soldiers operationally deployed to over 70 countries on any given day. In the last year, American soldiers helped the nation promote democracy in Haiti, deterred a new threat to regional stability in Southwest Asia, provided relief supplies to Rwandan refugees in Zaire, conducted peacekeeping exercises in Russia, reinforced peace in the Sinai, supported refugees in the Caribbean, protected United Nations operations in Somalia, treated wounded in Croatia, demonstrated resolve in Macedonia, and deterred aggression in Korea."[2]

As defense budgets decrease and the need for modernization increases, budgetary pressures have and will drive military leadership to creative solutions to solve defense issues and accomplish assigned missions. One such initiative has been the increased use of contracting for construction and services before, during and after military operations. This paper will develop a concept of strategic and operational engineering support, review a brief history of engineer force structure, analyze the scope of construction contracting used in recent military operations and recommend guidelines for the circumstances under which a unified commander-in-chief can utilize private sector resources.

Historically, the United States Army has mobilized adequate engineer troop capability to handle the field engineering requirements of the Army at war. The application of engineer resources to requirements at the three levels of war - strategic, operational and tactical - indicate that most construction contracting has been applicable to the strategic and operational levels. In order to set the stage for this analysis, it is first important to briefly review a modern history of engineer capabilities so that some reasonable comparisons of need can be made in the context of known operations. In summary, the paper will answer the question "Why and how should the United States Department of Defense utilize the engineering resources of the private sector to enhance accomplishment of military missions and advance the national interest in an extreme resource constrained environment?"

Strategic and Operational Level Engineering Support

Engineering support is integral to the application of military solutions to national security objectives across the spectrum of conflict. The organization, training and deployment of engineer soldiers and troop units contributes most significantly to the accomplishment of tactical military objectives. Engineer troops contribute to a lesser degree at the operational and strategic levels of war. Some national security objectives can be met only by application of construction contracting. LTG Henry J. Hatch, U. S. Army Chief of

Engineers from 1988-1992, stated often that private sector engineering and construction firms are the "fourth component" of the Corps of Engineers with engineer troop units, the facilities engineer organization and the United States Army Corps of Engineers (USACE) as a major Army command. This "fourth component", under the management of USACE Districts and Divisions around the world, has the capacity to accomplish the bulk of strategic and operational engineering work for the unified commanders-in-chief.

The nation has often needed to harness the "fourth component" for accomplishing strategic endstate conditions. Two examples, little known outside the engineering community, establish support for this thesis. They are the Israel Airbase construction from 1979 to 1982 and the extensive construction managed by USACE for the Kingdom of Saudi Arabia from 1951 to 1986. The Camp David Peace Accords formally established peace between Israel and Egypt. The Accords contained one major engineering requirement for the construction of two modern air force bases for Israel in the Negev Desert. These were to replace those given up in Israel's evacuation of the Sinai Peninsula. As an incentive for Prime Minister Begin to commit to movement out of the Sinai, Secretary of Defense Harold Brown offered help in building the Negev airbases. Secretary Brown promised to have the facilities completed before Israel finished its evacuation of the Sinai.[3] The Corps started planning for the air bases in September 1978. Contractors began construction in June 1980. A Corps-contractor team completed the bases in July 1982. This highly visible and fast paced construction effort, costing $916,000,000[4], contributed directly to the consolidation of peace between Israel and Egypt.

The Corps of Engineers relationship with the Saudi Arabian government began after World War II and continues to the present, although major construction ended in 1986. During this period, the Corps managed the "fourth component" in a construction program costing over $16,000,000,000. The program established adequate defense and other infrastructure for the Saudi Arabian government.

> "The many and varied activities of the Corps of Engineers in Saudi Arabia have helped the United States to maintain a special relationship with this important Arab friend in the Middle East."[5]

This program provided the facilities which enabled Central Command and numerous allies to deploy into the Kingdom using modern ports and airfields for a crisis unforeseen in the construction period. It also solidified a trust relationship between the United States and Saudi Arabia which contributed to the Saudi decision to allow United States forces to deploy into Saudi Arabia in August 1990.

> "When the Iraqi invasion occurred, the Saudi's experience with the Corps of Engineers helped convince government officials that they could ask the United States to come into their country and that the United States would respect their customs, do professional work and leave when the work was completed."[6]

These are the two best characterizations of the application of strategic engineering contributing to the accomplishment of national security objectives.

The strategic and operational level application of engineering support to the attainment of national security objectives continued into the requirements of operations after the fall of the Berlin Wall in 1989. Figure 1 illustrates the application of engineer resources to the three levels of war - strategic, operational and tactical. The illustration shows that the Army's engineer units are assigned traditional missions of mobility, countermobility and survivability essentially at the tactical and operational levels of war. The types of missions at the strategic level are usually very large in scope, require technical expertise not commonly found in troop units and require long periods of time to complete. These missions are most appropriately accomplished by construction contractors. It is at the operational level missions where there exists a resource constraint band where there may be projects done by either contractors or troop units. In some security circumstances, only engineer soldiers can do the job.

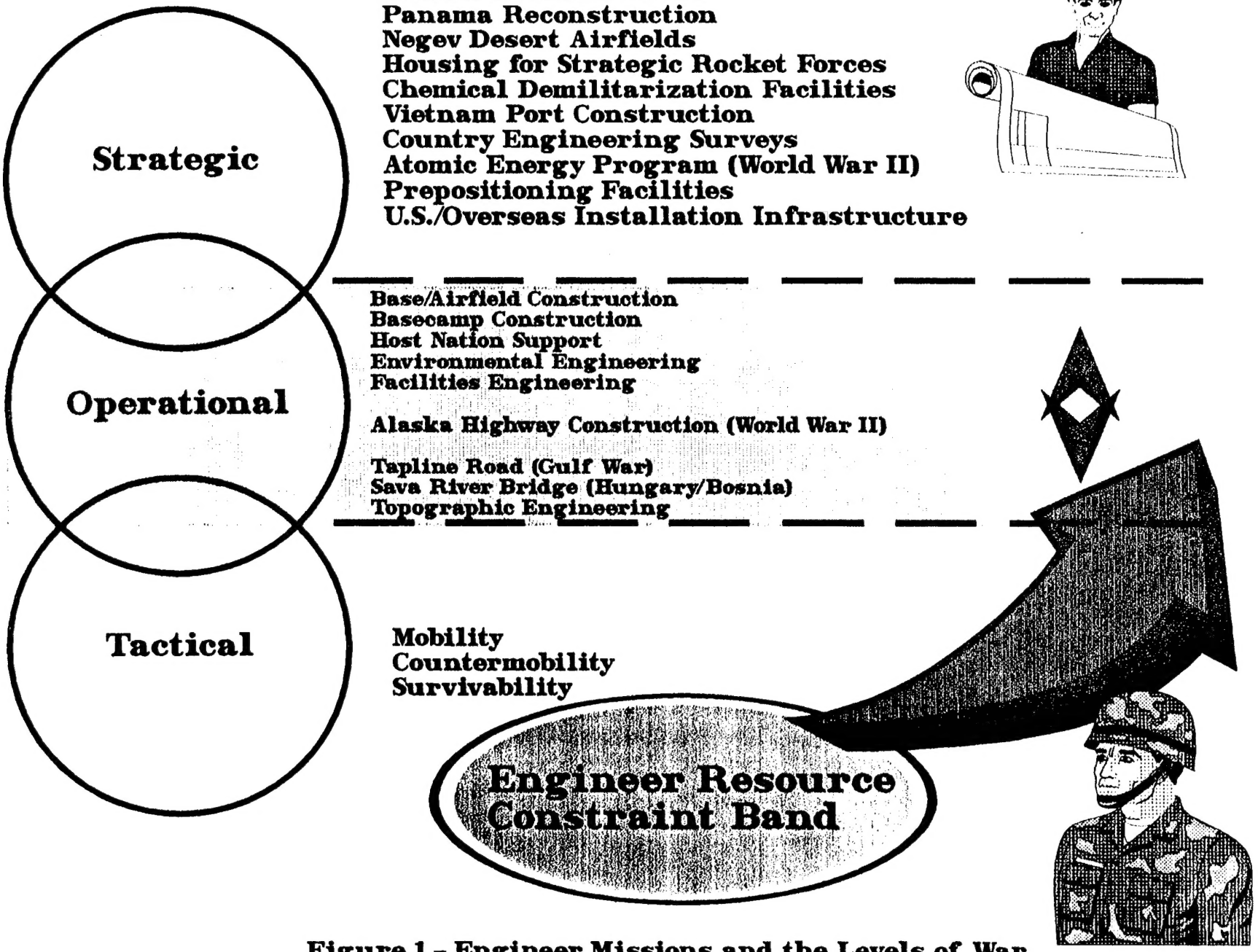

Figure 1 – Engineer Missions and the Levels of War

Certainly, the requirements for major engineer support in combat operations have led to some legendary feats. General Dwight D. Eisenhower, commenting on one such mission in support of the Sicily invasion, stated:

> "This incident involved the construction of the airfield on the little island of Gozo, lying just off Malta. It was so ill favored in the matter of terrain that British field engineers, who depended to a great extent upon hand tools and light equipment, had given up any hope of producing a field there in time for use in the Sicilian Campaign. The upshot was that messages began to fly through the air, and thirteen days from the time the first American construction unit stepped on the island the first fighter plane was taking off from the strip. This story was told to me over and over again by British officers on the island whose admiration for the American engineers was scarcely short of awe. This fighter strip gave us an additional base from which to sustain our attack against Sicily."[7]

Two recent major troop engineer missions which fit the impact of operational level of war are the Tapline Road mission which enabled the operational maneuver of both 18th Airborne Corps and 7th Corps in the Gulf War and the Sava River Bridge which enabled the United States Army forces to deploy from Hungary into Bosnia during the current NATO peacekeeping deployment. Both missions were accomplished primarily by engineer soldiers. Given the resources in organizations, equipment, expertise and leadership, the Army can count on its engineer troops to provide similarly valiant support in future conflicts. There will be, as demonstrated in Desert Shield and Desert Storm, a need to rely heavily upon the engineer units of the United States Army Reserve and the Army National Guard.

Military force structure is plummeting. The types of missions for which military forces are being deployed has reduced security risks for private sector contractors. The increased use of contractors seems to make great sense, but under what circumstances can contract support be most logically used? What are the implications for security, responsiveness, cost and the bottom line - mission accomplishment? In order to assess these issues, it is first necessary to review the current and projected engineer force structure along with some historical comparisons.

Brief History of Engineer Capabilities in Major Military Operations

The current United States Security Strategy calls for the military forces of the United States to be prepared to operate in an environment with two nearly simultaneous major regional contingencies (MRCs).

> "The focus of our planning for major theater conflict is on deterring and, if necessary, fighting and defeating aggression by potentially hostile regional powers, such as North Korea, Iran or Iraq. With programmed enhancements, the forces the Administration is fielding will be sufficient to help defeat aggression in two nearly simultaneous major regional conflicts."[8]

In reviewing several major conflicts or regions of major conflicts, it is very interesting to note the level of engineer force structure assembled to accomplish the missions assigned. Table 1 compares the engineer force structure deployed to the Southwest Pacific in World War II, the Korean Conflict, the Vietnam War and Southwest Asia in the Gulf War. For the purposes of comparison, the types of engineer units have been compiled under generic headings. The current engineer force structure programmed for a 10 division combat force retains less than 26% in the active force. By comparison, the numbers of engineer soldiers authorized are 21,519 for the active force, 41,464 for the Army Reserve and 20,492 for the Army National Guard. See Tables 2, 3 and 4.

During World War II, when this nation mobilized its full resources for a worldwide conflict, one theater of war - the Southwest Pacific, contained 12 times the engineer soldiers than the current force structure. Engineer forces grew from less than 1,000 in April 1942 to over 250,000 in October 1945. Engineers were 14-16% of MacArthur's forces for most of the war.[9] The Southwest Pacific area was much less developed than today, however, the force structure contrast is remarkable. Engineers in the Korean Conflict totaled 38,400 or 10% of Army forces.[10] In Vietnam, there were a maximum of 36,638 engineer soldiers deployed[11] - 1.7 times the number of soldiers in the current force structure and 11% of all Army forces deployed to Vietnam.[12] There was also a considerable construction contracting effort in Vietnam which concentrated on the

Table 1 - Engineer Troop Deployments
Historic Operational Areas

Type of Unit	Southwest Pacific WWII	Korean Conflict	Vietnam War	Southwest Asia
Brigade/Group HQ	36	15	8	9
Combat Bns	60	17	20	20
Construction Bns	29	12	15	9
Aviation Bns*	63	10	0	0
Engineer Troops Deployed	253421	38400	36638	23681
Engineer % of strength	16	11	11	4.4
Contracting Used	Local labor hired	No	Yes	Yes
Contractor Personnel	Relatively insignificant	None documented	51000	10000
Army Strength in Theater	1580000	241971	340000	526000

*During World War II, aviation engineer battalions were designed to support the Army Air Corps. In Vietnam, contractors accomplished this work.

table1.wks

construction of major cantonments needed for deployment of United States forces into Vietnam from 1965 to 1970. The official engineer history for Vietnam addresses the essential difficulties with management of an appropriate level of engineering support:

> "President Johnson's decision in November 1965 not to order a general call-up of Reserve and National Guard units imposed a major restraint on the deployment of sufficient numbers of engineer construction troops to Vietnam. The National Guard and the Reserves contained the majority of engineer construction units. This problem, along with the lack of a skilled local population, increased our reliance on civilian contractors for major construction in the combat area. Consequently, the contractor construction capability already in Vietnam had to be expanded. The magnitude of the contractor effort became so vast and diversified that it could correctly be termed a construction industry. The peak strength of the contractors' work force, attained in 1966, was 51,044 personnel, of which less than 10% were American.[13]

It should be noted that the engineer requirements include a considerable number of troops to run the facilities engineer activities.

In Southwest Asia during the Gulf War, the Army deployed 23,681 engineer soldiers to Saudi Arabia - 19,453 active duty, 2,275 National Guardsmen and 1,953 Reservists. This total was 4.4% of Army forces deployed into theater.[14] The CINC's decision to develop combat power on the ground led to an engineer and logistics tail shortage throughout the deployment. There was also a significant host nation support effort and construction contracting managed by the Corps of Engineers Middle East Africa Project Office, later named the Transatlantic Division. At its height, there were an estimated 10,000 construction contract personnel supporting the Gulf War construction effort.[15] If we assume that the focus of future war planning is toward MRCs in the Middle East and Korea, a rough projection for engineer requirements is 70,000 soldiers and 20,000 contract personnel. Tables 2, 3 and 4 clearly show the absolute need for reserve and national guard engineers. However, Presidential reserve call up decisions have been delayed or curtailed in Vietnam and the Persian Gulf War. If this trend persists

Table 2 - Engineer Force Structure
Total Personnel Strengths and Percentages

Component	TAA 92 (FY 88)	TAA 96 (FY 91)	TAA 99 (FY 95)	TAA 01 (FY 96)	TAA 03 (FY 98)
Active	43643	40025	24004	22556	21519
	30.9%	30.8%	28.2%	26.8%	25.8%
National Guard	63049	57245	39105	39415	41464
	44.6%	44.1%	45.9%	46.8%	49.7%
Reserve	34715	32663	22005	22312	20492
	24.5%	25.1%	25.9%	26.4%	24.5%
Total	141407	129933	85114	84283	83475

table2.wks

Table 3 - Army Engineer Force Structure Comparisons
Engineer Support for Total Force

	AC	NG	AR	TOTAL
Combat	13449	23775	5248	42472
	62.5%	57.3%	25.6%	50.9%
Combat Support	7384	15245	11720	34349
	34.3%	36.8%	57.2%	41.1%
Combat Service Support	686	2444	3524	6654
	3.2%	5.9%	17.2%	8.0%
Total	21519	41464	20492	83475

table3.wks

Table 4 - Engineer Force Structure
Total Engineer Battalions (AC/RC)

Type of Unit	FY91	FY96	FY98
Airborne/Air Assault	2/0	2/0	2/0
Light Infantry Divisional	5/5	2/1	2/1
High Technology Test Bns	1/0	0/0	0/0
Heavy Divisional	10/8	18/19	18/19
Wheeled/Mechanized	14/49	4/32	3/25
Corps Airborne/Light	2/0	2/2	2/3
Combat Heavy	14/31	8/29	7/26
Topographic	3/1	2/1	2/1
Prime Power*	0/0	1/0	1/0
Heavy Separate Brigade	0/0	0/7	0/7
Total Battalions	51/94	39/91	37/82

* Existed as a TDA organization in FY91.

table4.wks

into the future, construction demands will automatically drive commanders to a decision to use construction contracting.

Scope of Construction Contracting Support to Military Operations Since 1989

The post-Cold War era has delivered the world and the United States as its sole superpower a high level of uncertainty and turbulence. The world has witnessed pockets of aggression, instability, civil war and human suffering. In this environment, the United States has directed its military forces to execute operations supporting the national interest to:

1. Counter corruption and reinstate democracy in Panama
2. Turn back the heavy handed aggression of a dictator in the Middle East
3. Alleviate human suffering caused by the same dictator in northern Iraq
4. Stop mass starvation and restore internal stability in Somalia
5. Reinstate a democratically elected government in Haiti
6. Assist in stopping massive death due to disease in Rwanda and Zaire
7. Ensure establishment of peace out of the ruins of ethnic conflict in Bosnia.

Each of these operations has required the deployment of engineer soldiers and some construction contracting support. This section will describe the scope of the construction contracting used during the course of each operation. This review will lead toward a final analysis of the appropriate conditions under which United States military forces should consider use of construction contracting in support of national security operations..

During the Cold War, the potential conflict in Europe would have been conducted in a well developed physical environment. This has not been the case with most deployments in the post-Cold War era. Table 5 provides a basic comparison of infrastructure development in the nations where United States forces have deployed since 1989. The typical location for these operations has been a nation either undeveloped or in early stages of infrastructure development. In some cases, the infrastructure is among the world's poorest as in Haiti and Somalia. In Bosnia, a fractured nation imploding on its

Table 5 - Basic Comparison of National Infrastructure United States Military Operations Since 1989*

Country	Development Status Economic Strength	Useable Airfields Permanent > 3659 meters	Roads Paved	Seaports	Railroads	Pipelines
Panama	Developing Agrarian	109 38 0	8530 km 2745 km	3	238 km	130 km
Saudi Arabia	Developed Petroleum	195 71 14	74,000 km 35,000 km	7	1390 km	10,350 km
Kuwait	Developed/Destroyed Petroleum	4 4 0	3,900 km 3,000 km	5	None	1072 km
Iraq	Developing Petroleum	105 76 10	34,700 km 17,500 km	1	2457 km	6435 km
Somalia	Underdeveloped Agrarian/Livestock	59 8 2	22,500 km 2,700 km	4	None	15 km
Haiti	Underdeveloped Agriculture	11 3 0	4,000 km 950 km	8	40 km (Private)	None
Rwanda	Underdeveloped Agricuture	7 3 0	4,885 km 460 km	None	None	None
Bosnia	Developing Agriculture	24 5 0	21,168 km 11,436 km	None	Unknown exact status	264 km

*Central Intelligence Agency, The World Factbook 1994 ([Washington, D.C.]: Central Intelligence Agency, 1984), 306-307, 345-346, 220-221, 191-193, 361-363, 171-173, 332-334, 51-53.

table5.wks

own ethnically based vengeance, a once developing infrastructure has deteriorated from years of civil strife and neglect. Saudi Arabia's infrastructure benefited from large oil revenues, our willingness to support national infrastructure goals and a far sighted Saudi leadership. In most cases, military deployments can expect to engage an underdeveloped if not hostile environment - leading to the need for engineer activities to support deployment and force sustainment.

Operation Just Cause was an invasion of Panama by a joint task force under United States Southern Command. Operations lasted from 20-24 December 1989. Its objectives were to restore the democratically elected government of Guillermo Endara and bring General Manuel Noriega to justice for drug smuggling. The Mobile District, Corps of Engineers, provided the engineering and construction management expertise for post conflict recovery. Contractors built a refugee facility, conducted debris removal operations, demolished the Panamanian Defense Force Commandancia building, provided repairs to the Panamanian Department of Transportation Building and made other major building repairs. These projects, funded by United States Army South and the United States Agency for International Development, provided for cleanup of damages caused in the conduct of combat actions in and around Panama City. The 536th Engineer Battalion, USARSO's organic engineer battalion, and the 7th Engineer Battalion of the 7th Infantry Division, also assisted in the cleanup of rubble. Due to the limited capacity of deployed engineer troop units and the need for timely cleanup actions, the Mobile District's contracting actions were the most expedient and responsive by drawing on the private sector in Panama. Because the Panamanian Defense Forces were quickly suppressed, the security environment was conducive to contracting these construction activities. Total construction contracting volume from January to March 1990 was $2,315,000. This number pales in comparison with the scope of contracting executed during the Persian Gulf War and in the Kuwait recovery operations.

The Iraqi invasion of Kuwait in August 1990 led to the greatest challenge faced by United States military forces since the Vietnam War. Fortunately, the infrastructure created under the Corps of Engineers' presence in Saudi Arabia through 1986 had provided very modern seaport and airport facilities through which American and Allied forces could deploy. However, there were still needs for significant operational and strategic level engineer missions in support of Allied deployments and operational maneuver during the Gulf War. The Department of Defense had designated the United States Army Corps of Engineers (USACE) as its construction agent throughout the Middle East and Africa. USACE assigned most of the mission to its Middle East Africa Project Office (MEAPO). A Memorandum of Agreement between USACE and Third Army had developed a concept of operations for providing engineer support. USACE established MEAPO(Southwest Asia) to manage real estate and construction activities in support of CENTCOM.[16] The initial USACE element was on the ground 6 days after the first combat troops landed and was the first engineer unit in theater.[17] As troops arrived in Saudi Arabia, the lack of infrastructure support led to requirements for real estate and construction which were immediate and massive.[18] The first major construction contract was for six, 5,000 man life support areas with a contract amount of $26,000,000. Additional contracts were awarded for such activities as water wells, airfield repair, portable buildings, heliports and road repair and construction. A DOD team led by MG James W. Ray, Director of Military Programs in USACE, negotiated a Host Nation Support Agreement with Saudi Arabia which provided an initial check to the United States for $760,000,000.[19] Saudi Arabia committed to host nation support of up to $300,000,000 monthly.[20] Contract construction procedures developed over time included procedures for coordinating host nation support, construction contracting and troop construction.[21] By March 1991, the Dhahran Area Office was monitoring nearly $500,000,000 in contracts which included $150,000,000 in real estate leases. Due to the quick end of hostilities, nearly $200,000,000 in contracts were ultimately canceled.[22]

The requirements for this massive construction contracting effort grew in part from the fact that LTG Yeosock had established a "minimum essential force" of 140,000 troops. The "minimum essential force" led force planners to cut engineer units from the deploying force structure while others were slipped in the Time Phased Force Deployment List (TPFDL). Reserve units could not initially be called up.[23] Delays in the reserve call up and initial reserve deployment time limits of 90 days severely constrained the engineer force structure in theater. By October 1991, there were no echelons above corps engineer units in theater, but 4 combat heavy battalions were enroute.[24] In time, the 416th Engineer Command deployed to become the Wartime Theater Construction Manager.[25]

The Host Nation Support system was simply not responsive to the pace of requirements and the Corps was limited to construction contracts less than $200,000. Saudi officials could not comprehend the massive scope of US requirements.[26] In September 1990, Japan established the Gulf Peace Fund and agreed to construct a 200,000 man basecamp.[27] The Japanese did not build the camp, but ended up providing other kinds of support such as vehicles and construction materials. By early January, CENTCOM engineers had awarded about $350,000,000 in construction contracts. The Gulf Peace Fund also pledged $100,000,000 in projects and actively funded $50,000,000 to support noncombatant activities outside Saudi Arabia.[28] The procedures under which CENTCOM coordinated construction requirements proved to be effective as the command had developed a $600,000,000 construction program by the end of hostilities.[29] However, actual construction execution was limited to $135,280,121 by May 1991.[30]

During the conduct of Operations Desert Shield and Desert Storm, Kuwait called upon the United States to assist with war recovery. Kuwait needed help to restore essential services and help rebuild the nation from significant war damages caused by Iraq's plundering and by Allied military operations. The Emir of Kuwait requested Corps of Engineers support from President Bush. Again under MEAPO, the Corps established

the Kuwait Emergency Recovery Office (KERO) to plan and manage an initial program of reconstruction. As the war started, the Corps signed a $46,300,000 Foreign Military Sales (FMS) contract to support Kuwait recovery and establish KERO. After the initial FMS funding, the rest of the effort was funded under the authority of the Foreign Assistance Act.[31] Starting on 4 March 1991 and ending 300 days later, KERO placed over $350,000,000 on construction contract repair work. Their tasks included restoration of the national electrical distribution system, 200 electrical substations, water mains and pump units, repair of the highway network, sanitary sewers, 2 seaports, 2 military airfields, the international airport, 150 public schools and 850 public buildings.[32] Within 10 days of entering Kuwait, KERO had awarded eight contracts for $25,400,000. The KERO report recommends future activities of this type consider the use of cost plus contracts, develop quality construction standards and be prepared to enter into a greater degree of coordination with host nation government officials.[33]

Another Gulf War aftermath was Iraq's suppression of the Kurdish population in northern Iraq. Operation Provide Comfort sought to alleviate the suffering of Iraqi Kurds while securing them from Iraqi Army assaults. This operation was the largest international military relief effort since the Berlin Airlift. Thousands of additional troops were sent to the Iraq-Turkish border to distribute food, tents, clothing and blankets to the Kurdish population. The Europe District, Corps of Engineers, sent a team to Turkey to establish relocation camps for the displaced Kurds. Contractors constructed three refugee camps with latrines, water tanks and warehouse tents for $3,000,000.[34] Though small in comparison to construction activities in Saudi Arabia and Kuwait, timeliness was required due to massive daily death rates.

Beginning with Operation Restore Hope in Somalia, the primary means of construction contracting has been through a contract specifically established to support contingency operations - the Logistics Civil Augmentation Program (LOGCAP). Managed by the Corps of Engineers' Transatlantic Program Center, LOGCAP provides a

worldwide umbrella contract to plan for and provide logistical support to US Army forces deployed in contingencies.[35] The contract is designed to provide life support to deployed troops. It's construction role is generally limited to temporary living facilities and other troop support. This contract has been utilized in Somalia, Haiti, Southwest Asia, Rwanda/Zaire, Surinam and Italy. The contract is currently supporting a massive effort in the Bosnian peacekeeping operation.

A series of United Nations and United States led operations sought to restore stability to Somalia. The people of this extremely poor nation were suffering from starvation and civil war. The LOGCAP contractor supported 22,000 troops ashore in Somalia with such actions as water and sanitary facilities, debris removal, security lighting and building rehabilitation. The tense security situation required additional precautions and movement in military convoys.[36]

Closer to the United States, Haiti continued its slide into chaos in 1994. The United States sought to restore Jean Bertrand Aristide to the Presidency of the impoverished nation in Operation Uphold Democracy. Construction activities performed under LOGCAP in Haiti included basecamp area facilities and road construction for a cost of $96,000,000. These costs includes the logistics activities at the camps.[37]

In Zaire, United States European Command was tasked to assist in provision of safe water for Rwandans driven out of their country by intertribal warfare and mass slaughter. The Transatlantic Division tasked the LOGCAP contractor initially to provide water production and distribution at Goma, Zaire and development of basecamps at Goma, Kigali, Rwanda and Entebbe, Uganda as well as logistics support. Due to the quickly changing pace of the operation, the contractor was actually tasked with a limited mission to provide 500,000 gallons of water per day at Goma.[38]

Operation Joint Endeavor in Bosnia seeks to provide an environment within which the ethnic wars between Serbs, Croatians and Muslim Serbs can be checked long enough for the December 1995 Peace Accords to take hold. As of March 1996, the Army was

Table 6 - Construction Contracting Costs
United States Military Operations Since 1989

Country	Timing of Contracting Support	Major Projects	Costs
Panama	Post Conflict	Clean Up Operations Barracks Rehabilitation Building Repair	$2,315,000
Saudi Arabia	Pre Conflict During Conflict Redeployment	Life Support Areas Water Wells Heliports Dust Control Airfield Aprons Vehicle Wash Facilities Real Estate Hardstands	$135,000,000
Kuwait	Post Conflict Recovery	Electrical System Water System Sewer System Roads Schools Goverment Buildings Airports Seaports	$350,000,000 See Note 2.
Northern Iraq	During Heightened Tensions	Refugee Camps	$3,000,000
Somalia (Note 1)	Throughout Deployment	Life Support Areas	$62,000,000
Haiti (Note 1)	Throughout Deployment	Life Support Areas	$133,000,000
Rwanda/Zaire (Note 1)	Throughout Operations	Water Supply	$6,300,000
Southwest Asia(Note 1)	During heightened tensions	Life Support Areas	$5,100,000
Bosnia (Notes 1 and 3)	Throughout Operations	Life Support Areas	$400,000,000

Note 1: Work accomplished by LOGCAP contractror. Figures include logistics costs.
Note 2: Funds provided by the Kuwait Government.
Note 3: Estimated costs as of March 1996.
table6.wks

projecting a cost of $400,000,000 for LOGCAP services. Brown and Root Services Company, the LOGCAP contractor, has 5500 personnel supporting the operation. Colonel Tony Nida, Commander, Transatlantic Programs Center, U.S. Army Corps of Engineers, summed up the current experience with LOGCAP in Bosnia by saying:

> "We are reengineering the way the Army supports the deployed force during military contingency operations. LOGCAP has allowed us to accomplish more in the early phases of a deployment. This new force multiplier comes from the contractor's ability to adjust operations quickly to meet the expanding requirements by tapping local crafts and tradesmen and bringing in supplies from the most readily available source. LOGCAP has shown that the private sector is now a viable member of the military effort.[39]

Although this massive effort has experienced growing pains, the flexibility and responsiveness which the contractor has brought to the support of the field Army has provided excellent support. This huge effort seems to indicate that the Army is overly dependent upon LOGCAP support in the Bosnia operation, but it is too early to make a final judgment. A summary of construction contracting activity since 1989 is at Table 6.

Development of Guidelines for Employment of Construction Contracting in Support of Military Operations

The foregoing review of engineer force structure and construction contracting in support of United States forces in the field and United States national security objectives leads to an analysis of the circumstances under which it is appropriate to seek assistance from private sector construction contractors. In many cases, it is simply most appropriate for engineer soldiers to be assigned engineer support missions. There is no question that engineer troop units should be assigned most tactical level engineer missions - those which are conducted under the more dangerous environments for which soldiers are trained and equipped to operate. There should also be no question that engineers from the private sector are most suitable to be assigned most engineer missions affecting strategic level objectives. As mentioned, there exists a resource constraint band at the operational level of engineer mission assignments where either private sector contractors or engineer units

can accomplish missions either singly or in mutual support. As recognized in Vietnam, there is a place for both:

> "In general, the contractor was given the larger, more complicated jobs in relatively secure areas, while troops concentrated on work in forward areas. But there was no sharp division between work assigned to contractors or troops. In a number of instances, contractors and engineer troops worked together. There were times when contractors were not available and projects had to be turned over to engineer troop units. At other times, troops were needed to support tactical operations and their projects had to be left to contractors."[40]

Operation Desert Shield/Desert Storm experienced similar synergistic effects between contractors and engineer troops.

This section proposes a general decision framework within which the Department of Defense and the regional warfighting commanders-in-chief could consider the use of construction contractors in lieu of engineer troop units to accomplish national (strategic) and theater (strategic and operational) objectives. The essential elements of this decision in any case rests in consideration and analysis of the following ten factors:

Purpose of the Construction Requirement. Peacetime basing and preconflict staging areas are most effectively constructed by contractors due to lower public visibility and generally higher complexity. Minor peacetime construction and all construction under difficult security conditions require troops. Degree of permanence is also a factor here. If facilities require a long term permanence, contractors are best suited. If facilities are intended to have a low degree of permanence, such as exercise related construction, troops are best suited.

Availability of Capable Engineer Units. The active/reserve engineer force structure mix is projected to be 25%/75% through FY2003. A majority of active duty engineer troops (60%) are dedicated to divisional combat support roles while 28% or 7,384 soldiers are in the combat support role. Though capable in their limited context, these units are spread around CONUS, Europe, Korea and Panama. Force planners must determine the capabilities and availability of active units and analyze the impacts of high

operational and personnel tempo. Perhaps the most severe impact will fall in the arena of a reserve call up decision. As in Vietnam and the Persian Gulf, a delayed Presidential reserve call up or a decision not to call up reserves will be a severe constraint which will require a greater degree of contract construction effort. If force planners determine that active duty engineer units have experienced an extremely high optempo, such as existed immediately after Desert Storm, contract construction should be considered. The phasing of engineer troops into theater under the TPFDL can also severely constrain engineer capability. Force planners must recognize the need for engineer capabilities and balance force structure flow with combat units. Delayed engineer troop deployment will also lead to demand for construction contracting effort.

The Existing Security Environment. The degree of security risk in the theater of operations will have an impact on both the efficiency of construction operations and the decision for contractor support. At higher levels of security risk, the physical and psychological drain will degrade capability to do efficient construction work.. In peacekeeping or low intensity environments, contractors can operate effectively, but may require support of ground troops to secure work areas or need to be replaced with engineer troops if the security risk increases to the degree that contractors cannot keep personnel on site. This may be needed to a greater degree as work progresses toward high risk areas. In mid to high intensity environments, engineer troop units are better equipped to operate and provide limited local security. Contractors may operate behind a secure corps rear boundary, but may need to be trained and equipped in chemical warfare protection if the threat exists. The pace of combat operations may require engineer troops to be moved forward for combat support, leaving projects undone or passed to contractors. The security environment during troop deployment may require that initial troops in country are predominantly combat forces, driving a higher degree of reliance an contractors for initial construction work. In peacekeeping operations, contractors hire

many local nationals. This leads to stability and a vested interest by the local government in providing a secure environment for contract operations.[41]

Political Climate Supporting Troop Deployment in the Host Nation. The presence of US troops in a host nation often signals a deeper cooperation and commitment of the host nation with United States interests. Host nation officials may not want to send such a signal to their populace or to potential adversaries. In those nations where troop deployment is politically unacceptable or severely constrained, contract construction may be the only viable option. In those nations where it is politically feasible to deploy troops, either adequate engineers must be phased in the TPFDL to accomplish engineer missions, or arrangements for contract construction made.

Complexity of the Construction Requirement. Highly complex construction projects or those with massive scope should be accomplished by contract. These projects, requiring skills and specialized equipment not available in engineer troop units, must call upon the technical depth, engineering experience and diversity of equipment which is available in the private sector. These projects also require long lead times for design, contractor procurement and construction execution. They also are projects requiring the highest quality and maximum longevity. Engineer troop construction is generally temporary in nature and solid, but is generally constructed with lower durability.

Funding Source for Construction Requirement. Construction is a costly process, often ranging in the tens to hundreds of millions of dollars. The source and timely availability of adequate funds can drive whether construction contracts can be executed in a timely fashion. Contractors can be most effectively used when adequate, timely funds transfers are conducted from host nations, other interested nations, pooled resources from multinational coalitions or service operations funds. During Desert Shield/Desert Storm, Saudi Arabia's provision of billions in host nation support and Japan's pledge to provide the Gulf Peace Fund provided significant additional resources

for construction. Current guidance on use of funds provided by Congress must be followed.

Host Nation Capability to Support Construction Contracting. A major factor in determining whether contracts can be used at all is the resource availability within the host nation. Developed nations have a rich industrial base, subcontractors, skilled labor pool and equipment resources. In underdeveloped or developing nations, these resources are often either not available, or if available, are poorly maintained, inexperienced or unreliable. If contractors are required despite the lack of host nation capability, contracting can be accomplished, but costs will escalate to the degree that management, manpower or equipment must be imported to the operational area from the United States or other nations.

Time Phasing of Military Operation or National Security Objective. The overall objectives of the contingency operation will drive construction requirements. Each operation is unique in mission and intensity of pace and timing. If the mission requires immediate deployment of combat forces, engineers may be delayed from developing a significant capability until weeks or months into the operation. In any case, a construction contract management cell from an appropriate USACE organization must be deployed early and dynamically engage construction contractors to fit the pace of operations. In some cases, engineers are placed in a position of nonexistent or inadequate engineer troop resources without a responsive contracting capability. Force planners, with engineer advisement, must anticipate overcoming these challenges. This is really a question of responsiveness. Troop units are more responsive to changes in mission and location. Contractors who have hired local or third country nationals do not move as easily as troop units. A contractor's capability is limited by what he brings to the original requirement and may take more time to resource.[42] The bottom line must be anticipation and meeting CINC support requirements.

Political Considerations. Congressional and national polity demands occasionally enter the contracting decision framework. Congressmen may demand employment of particular reserve engineer units to have their districts represented in conflicts with popular support. On the other hand, hardships for individual reservists give politicians one more issue to consider when judging the merits of the operation relative to national interests.[43] Since such a high percentage of engineers are in the reserves, this is potentially a major decision factor. Congress and DOD may require some equalities in the use of US based construction firms or use small business resources.

Table 7 - Decision Factors for Selection of Construction Contracting vs Engineer Troop Deployment

Factor	Contracting Preferred	Troop Deployment Preferred
Purpose	Peacetime basing	Minor staging areas
	Complex preconflict staging areas	Remote locations requiring selfsufficiency and security
	High degree of permanence	Initial standards of construction
	Strategic air and sea ports	
Troop Availability	Delayed or no reserve call up	Available active duty troops
	Excessive troop optempo	Timely reserve call up
	Engineer troops delayed in TPFDL	Timely TPFDL deployment
Security Environment	US or host nation security support	Trained and equipped for unsecure environments
	Chemical protection capable	Engineer troops deployed early
	Combat forces in build up	
Host Nation Political Climate	Troop deployment unacceptable	Troop deployment acceptable
	Contracting acceptable	Host nation wants to signal intent
	Host nation does not want to signal intent	
Construction Complexity	Massive scope of work	Little mechanical/electrical
	Highly complex projects	Supplement with leased equipment
	Specialized equipment needed	Supplement with contractor capability
Funding Source	Host nation	US DOD operations funds
	Interested nations	
	Mulitinational coalitions	
	Congressional appropriations	
Construction Contracting Capability in Nation	Capable contractors exist	Limited contracting capability
	Capable subcontractors exist	Limited skilled labor pool
	Skilled labor pool available	Limited equipment availability
	Adequate equipment available	Early entry operations
	US based contractors deploy	Weak infrastructure
Time Phasing	Immediate construction required	Timing allows deployment
Operating Environment	Life support resources available	Severe or remote operating areas
Political Considerations	Reasonably low political interference	Congressional demand for reserve utilization IAW Presidential decision

table7.wks

Conclusions

United States military operations abroad will continue to demand a level of construction effort necessary to meet unified command operational objectives. Where requirements can be predicted in advance, the considerable capabilities of the worldwide engineering and construction community can be effectively utilized. The circumstances surrounding each operation will differ markedly as to demand and ability to use private sector resources. Engineer troop units are best suited for early entry operations. Contractors are most effective prior to conflict and in areas located in the COMMZ to support staging and sustainment and redeployment. During conflict contractors are a supplement, in the right security circumstances, to engineer troop capabilities. Contracting becomes less effective as projects approach the forward areas of conflict. In postconflict situations, contractors initially support, and later provide the majority of reconstruction effort as troops handle more dangerous engineering tasks. During peacekeeping and stability operations, a significant contracting operation can be an effective, but costly alternative to a much higher level of engineer troop deployment. The guidelines in this paper provide an outline for development of a decisionmaking process for the use of construction contracting in support of military operations. It is important to note that like any other resource supporting the combatant commander, there must be a process for exercising these capabilities in peacetime so that they can be effectively utilized in conflict.

Endnotes

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